OBSERVATIONS ON HISTOLOGY AND PHYSIOLOGY OF THE CERVICAL MUCOSA OF RAT AND MONKEY

by

CLARA EDDY HAMILTON

B. S., University of Georgia, 1942

M. A., University of Illinois, 1944

AN ABSTRACT OF A THESIS

SUBMITTED IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF PHILOSOPHY IN ZOOLOGY IN THE GRADUATE SCHOOL OF THE UNIVERSITY OF ILLINOIS

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OBSERVATIONS ON THE CERVIX OF THE RAT

In the study of the cervical mucosa of 66 rats, cyclic changes and those induced by administration of estrin were recorded in terms of mucosal heightening, contributions of cells and mucus to the genital discharge, cell types in the mucosa, presence and distribution of leucocytes and mucus production.

It was found that during estrus the cervix had two well differentiated areas, an upper non-cornified region, and a lower cornified one that added scales to the vaginal smear. The metestrous cervix was inactive and emitted only a few leucocytes and mucus cells and did not exhibit sharp differentiation between the upper and lower segments. The diestrous cervix contributed much mucus, numerous leucocytes and a few deep cells to the genital discharge. The upper and lower regions, again appeared similar. The proestrous cervix had a superficial lighter staining region which was added to the genital discharge and a deep darkly staining region which was cornified in the lower segment of the cervix.

In pregnancy and pseudopregnancy, the cervix became mucified and developed straight glands, with these changes more marked in the lower cervix than in the upper. In the pseudopregnant cervix regression generally began after the twelfth day.

Estrin caused an estrous reaction in the cervix of the ovariectomized and immature female rat, with a more pronounced and longer lasting effect in the castrated adult than in the intact immature 21-day old female.

OBSERVATIONS ON THE CERVIX OF THE RHESUS MONKEY

In the study on the cervical mucosa of 132 rhesus monkeys, cyclic changes and those induced by administration of exogenous hormones were recorded in terms of the cellular morphology of the epithelium (height, position of nuclei, content of mucus, secretion, and regression). The presence or absence of leucocytes was also noted.

A curve based on the measurements of the ovulatory cycle was constructed. This curve paralleled that established by Markee and Berg on blood estrogen levels in man with a slight lag or refractory period. In both instances there were increases of cell heights and blood estrogen levels respectively on days 3, 15, and 22. On the basis of this, one would seem to be justified in concluding that the heightening of the cells in the cervical mucosa is due to the action of estrogen, while the sudden periodical drops in blood estrogen cause secretion and consequent regression of the cervical mucosa

of the canal and glands. Secretion might then be considered the cervical counterpart of menstruation. Leucocytes were most abundant during menstruation and during the post-ovulatory phase. With the rise of estrogen, the cervical glands developed complexity during the cycle and were morphologically somewhat similar to the rabbit uterus in pseudopregnancy.

The anovulatory cycle was marked by a premenstrual growth of the cervical epithelium presumably resulting from a sharp rise in estrogen concentration of the blood during the latter part of the cycle. Cell heights dropped before menstruation; the mucosa was not rebuilt until after day 18. In the anovulatory cycle, therefore, there would seem to be low estrogenic output followed in the latter half of the cycle by a maximal output.

During pregnancy there was extensive proliferation of the cervix which became a highly labyrinthine glandular structure manufacturing a large amount of mucus.

The cervix of the prepuberal and adolescent monkey exhibited responses varying, as might be expected, with individual ovarian activity.

Administration of hormones in castrates corroborated the conclusion that the cervix is particularly responsive to estrogen. Glandular development and mucosal heightening occurred only when estrogen in adequate quantities was administered. Within the dosage used, no inhibition of the estrogenic affect on the cervix by progesterone or testosterone was discernable. Progesterone but not testosterone enhanced the mucus content of the cells when administered alone. On the other hand, either alone, but more particularly testosterone, was capable of maintaining the integrity of the cervix for a time after estrogen withdrawal.

Cervical development followed administration of gonadotrophs because of their action on the ovary.

VITA

Clara Eddy Hamilton was born March 14, 1923, in New Haven, Connecticutt. In June 1923, she moved to Louisville, Kentucky. From 1932 to 1934, she lived in Arlington County, Virginia. Since 1934, Augusta, Georgia has been her home. She graduated with first honors in 1939 from Tubman High School for Girls, Augusta. She attended the University of Georgia from 1939 until December, 1942, receiving at the end of this time the B. S. degree with a major in Zoology. Since January, 1943, she has been a student in the Graduate School of the University of Illinois. The M. A. in Zoology was attained October, 1944. Six weeks in the summer of 1945 were spent at Scripps Institute of Oeanography, La Jolla, California.

Two summers (1940 and 1941) were spent as illustrator at the Medical School of the University of Georgia, Augusta, Georgia. While at Illinois, she was research assistant for one semester, teaching assistant for five semesters, and a fellow for the last two semesters.

Honorary and professional societies that she belongs to are: Alpha Lambda Delta, Zodiac, Gamma Sigma Epsilon, Xi Phi Zi, Phi Kappa Phi, Phi Beta Kappa, Phi Sigma, Sigma Delta Epsilon, Iota Sigma Pi, associate in Sigma Xi, and A. A. A. S.

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